We claim:

1. An autonomous cleaning apparatus, comprising:

a drive system operable to enable movement of the cleaning apparatus;

a controller in communication with the drive system, the controller including a processor operable to control the drive system to provide at least one pattern of movement of the cleaning apparatus; and

a debris sensor for generating a debris signal indicating that the cleaning apparatus has encountered debris;

wherein the processor is responsive to the debris signal to select a pattern of movement of the cleaning apparatus.

2. The apparatus of claim 1 wherein the pattern of movement comprises spot coverage of an area containing debris.

3. The apparatus of claim 1 wherein the pattern of movement comprises steering the cleaning apparatus toward an area containing debris.

4. The apparatus as in one of claims 1-3 wherein the debris sensor comprises spaced-apart first and second debris sensing elements respectively operable to generate first and second debris signals; and

wherein the processor is responsive to the respective first and second debris signals to select a pattern of movement.

5. The apparatus as in one of claims 1-4 wherein the debris sensor comprises a piezoelectric sensor element located proximate to a cleaning pathway of the cleaning apparatus and responsive to a debris strike to generate a signal indicative of such strike.

6. An autonomous cleaning apparatus, comprising:

a drive system operable to enable movement of the cleaning apparatus;

a controller in communication with the drive system, the controller including a processor operable to control the drive system to provide at least one pattern of movement of the cleaning apparatus; and

a debris sensor for generating a debris signal indicating that the cleaning apparatus has encountered debris;

wherein the processor is responsive to the debris signal to select an operative mode from among predetermined operative modes of the cleaning apparatus.

7. The apparatus of claim 6 wherein selection of an operative mode comprises selecting a pattern of movement.

8. The apparatus of claim 7 wherein the pattern of movement comprises spot coverage of an area containing debris.

9. The apparatus of claim 7 wherein the pattern of movement comprises steering the cleaning apparatus toward an area containing debris.

10. The apparatus as in one of claims 6-9 wherein the debris sensor comprises spaced-apart first and second debris sensing elements respectively operable to generate first and second debris signals; and

wherein the processor is responsive to the first and second debris signals to select a pattern of movement.

11. The apparatus of claim 10 further wherein the processor is responsive to differences in the first and second debris signals to steer the cleaning apparatus in a direction of debris.

12. The apparatus as in one of claims 6-11 wherein the debris sensor comprises a piezoelectric sensor element located proximate a cleaning pathway of the cleaning apparatus and responsive to a debris strike to generate a signal indicative of such strike.

13. A cleaning apparatus comprising:

a cleaning pathway for transporting debris;

a piezoelectric sensor located proximate to the cleaning pathway and responsive to a debris strike to generate a debris signal indicative of such strike; and

a processor responsive to the debris signal to change an operative mode of the cleaning apparatus.

14. The apparatus of claim 13 wherein the change in operative mode comprises illuminating a user-perceptible indicator light.

15. The apparatus of claim 13 wherein the change in operative mode comprises changing a power setting.

16. The apparatus of claim 13 wherein the change in operative mode comprises reducing a movement speed of the apparatus.

17. A debris sensor for a cleaning apparatus, the debris sensor comprising:

a piezoelectric element located proximate to a cleaning pathway of the cleaning apparatus and responsive to a debris strike to generate a first signal indicative of such strike; and

a processor operable to process the first signal to generate a second signal representative of a characteristic of debris being encountered by the cleaning apparatus.

18. The sensor of claim 17 wherein the characteristic is relative quantity of debris.

19. The sensor of claim 17 wherein the characteristic is a vector from a present location of the cleaning apparatus to an area containing debris.

20. The sensor of claim 17 wherein the processor is further operable, in response to the second signal, to change an operative mode of the cleaning apparatus.

21. The sensor of claim 20 wherein the change of operative mode comprises changing a power setting.

22. The sensor of claim 20 wherein the change of operative mode comprises illuminating a user-perceptible indicator light.

23. The sensor of claim 20 wherein the change of operative mode comprises reducing a movement speed of the cleaning apparatus.

24. The sensor of claim 17 wherein:

the piezoelectric element is mounted proximate to the cleaning pathway by mounting elements, and

the mounting elements comprise at least one mounting screw and associated elastomer mounting grommet.

25. The sensor of claim 24 wherein the elastomer mounting grommet receives the mounting screw and provides vibration dampening for the piezoelectric element mounted proximate to the cleaning pathway by the mounting screw.

26. The apparatus of claims 1 or 7 wherein the processor is operable to receive the debris signal and calculate therefrom a debris gradient, representative of changes in debris strikes, as the cleaning apparatus moves.

27. The apparatus of claim 26 wherein the processor is responsive to the sign of the debris gradient to select a pattern of movement.

28. The apparatus of claims 5, 12 or 13 wherein the piezoelectric sensor element comprises a flexible piezoelectric film.

29. The sensor of claim 17 wherein the piezoelectric element comprises a flexible piezoelectric film.

30. The apparatus of claim 28 wherein the piezoelectric sensor element comprises multiple electrically isolated sections.

31. The sensor of claim 29 wherein the piezoelectric element comprises a flexible piezoelectric film.

32. A method of operating an autonomous cleaning apparatus, the method comprising:

using a processor to control a drive system of the cleaning apparatus to provide at least one pattern of movement of the cleaning apparatus;

using a debris sensor in communication with the processor to generate a debris signal indicating that the cleaning apparatus has encountered debris; and

using the processor to select a pattern of movement of the cleaning apparatus in response to the debris signal.

33. The method of claim 32 wherein the pattern of movement comprises spot coverage of an area containing debris.

34. The method of claim 32 wherein the pattern of movement comprises steering the cleaning apparatus toward an area containing debris.

35. The method as in one of claims 32-34 wherein the debris sensor comprises spaced-apart first and second debris sensing elements respectively operable to generate first and second debris signals; and

wherein the processor is responsive to the respective first and second debris signals to select a pattern of movement.

36. The method as in one of claims 32-35 wherein the debris sensor comprises a piezoelectric sensor element located proximate to a cleaning pathway of the cleaning apparatus and responsive to a debris strike to generate a signal indicative of such strike.

37. A method of operating an autonomous cleaning apparatus, the method comprising:

using a processor to control a drive system of the cleaning apparatus to provide at least one pattern of movement of the cleaning apparatus;

using a debris sensor in communication with the processor to generate a debris signal indicating that the cleaning apparatus has encountered debris; and

using the processor to select, responsive to the debris signal, an operative mode from among predetermined operative modes of the cleaning apparatus.

38. The method of claim 37 wherein selection of an operative mode comprises selecting a pattern of movement.

39. The method of claim 38 wherein the pattern of movement comprises spot coverage of an area containing debris.

40. The method of claim 39 wherein the pattern of movement comprises steering the cleaning apparatus toward an area containing debris.

41. The method as in one of claims 37-40 wherein the debris sensor comprises spaced-apart first and second debris sensing elements respectively operable to generate first and second debris signals; and

wherein the processor is responsive to the first and second debris signals to select a pattern of movement.

42. The method of claim 41 further wherein the processor is responsive to differences in the first and second debris signals to steer the cleaning apparatus in a direction of debris.

43. The method as in one of claims 37-42 wherein the debris sensor comprises a piezoelectric sensor element located proximate a cleaning pathway of the cleaning apparatus and responsive to a debris strike to generate a signal indicative of such strike.

44. A method of operating a cleaning apparatus, the method comprising:

using a piezoelectric sensor located proximate to a cleaning pathway of the cleaning apparatus and responsive to a debris strike to generate a debris signal indicative of such strike; and

using a processor in communication with the piezoelectric sensor and responsive to the debris signal to change an operative mode of the cleaning apparatus.

45. The method of claim 44 wherein the change in operative mode comprises illuminating a user-perceptible indicator light.

46. The method of claim 44 wherein the change in operative mode comprises changing a power setting.

47. The apparatus of claim 44 wherein the change in operative mode comprises reducing a movement speed of the apparatus.

48. A method of operating a cleaning apparatus, the method comprising:

using a piezoelectric element located proximate to a cleaning pathway of the cleaning apparatus and responsive to a debris strike to generate a first signal indicative of such strike; and

using a processor in communication with the piezoelectric element and operable to process the first signal to generate a second signal representative of a characteristic of debris being encountered by the cleaning apparatus.

49. The method of claim 48 wherein the characteristic is relative quantity of debris.

50. The method of claim 48 wherein the characteristic is a vector from a present location of the cleaning apparatus to an area containing debris.

51. The method of claim 48 wherein the processor is further operable, in response to the second signal, to change an operative mode of the cleaning apparatus.

52. The method of claim 51 wherein the change of operative mode comprises changing a power setting.

53. The method of claim 51 wherein the change of operative mode comprises illuminating a user-perceptible indicator light.

54. The method of claim 51 wherein the change of operative mode comprises reducing a movement speed of the cleaning apparatus.

55. The method of claim 48 further comprising:

mounting the piezoelectric element proximate to the cleaning pathway using at least one mounting screw and associated elastomer mounting grommet.

56. The method of claim 55 wherein the elastomer mounting grommet receives the mounting screw and provides vibration dampening for the piezoelectric element mounted proximate to the cleaning pathway by the mounting screw.

57. The method of claims 32 or 38 wherein the processor is operable to receive the debris signal and calculate therefrom a debris gradient, representative of changes in debris strikes, as the cleaning apparatus moves.

58. The method of claim 57 wherein the processor is responsive to the sign of the debris gradient to select a pattern of movement.

59. The method of claims 36, 43 or 44 wherein the piezoelectric sensor element comprises a flexible piezoelectric film.

60. The method of claim 48 wherein the piezoelectric element comprises a flexible piezoelectric film.

61. The method of claim 59 wherein the piezoelectric sensor element comprises multiple electrically isolated sections.

62. The method of claim 60 wherein the piezoelectric element comprises a flexible piezoelectric film.